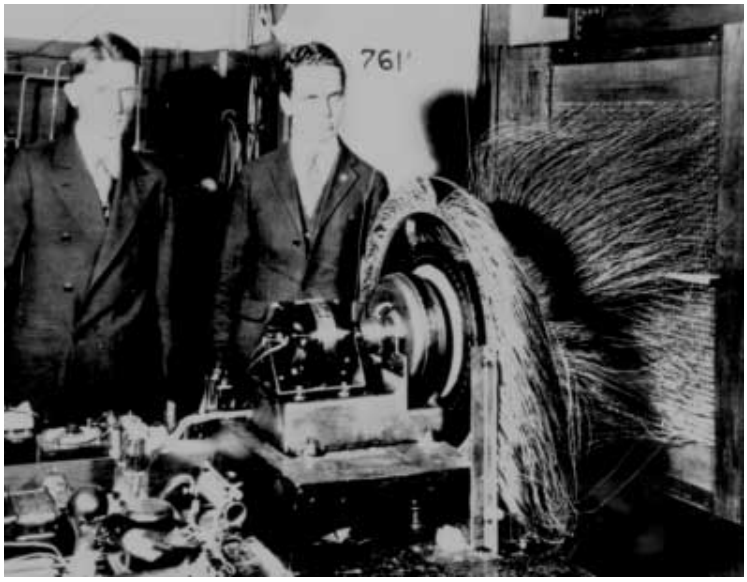
Mechanical Television

Bell Labs Matrix Screen Receiver

In 1927 Bell Labs built a large screen TV set using a specially designed neon lamp with 2500 individual anodes, arranged in 50 rows of 50 anodes. A huge switch was attached to the motor, routing the electrical signals to one anode at a time. This set was used to televise Herbert Hoover in a demonstration in April of 1927. This was accomplished both by wire and by radio on experimental station 3XN from Whippany, N. J., 22 miles from New York, to the Bell Laboratories building in New York City where the speakers and performers were readily recognized on the receiving screen. The voices of the persons at Whippany were transmitted, and reproduced by means of a loudspeaker. Here is a 1928 magazine article.

The screen as it appeared in 1927



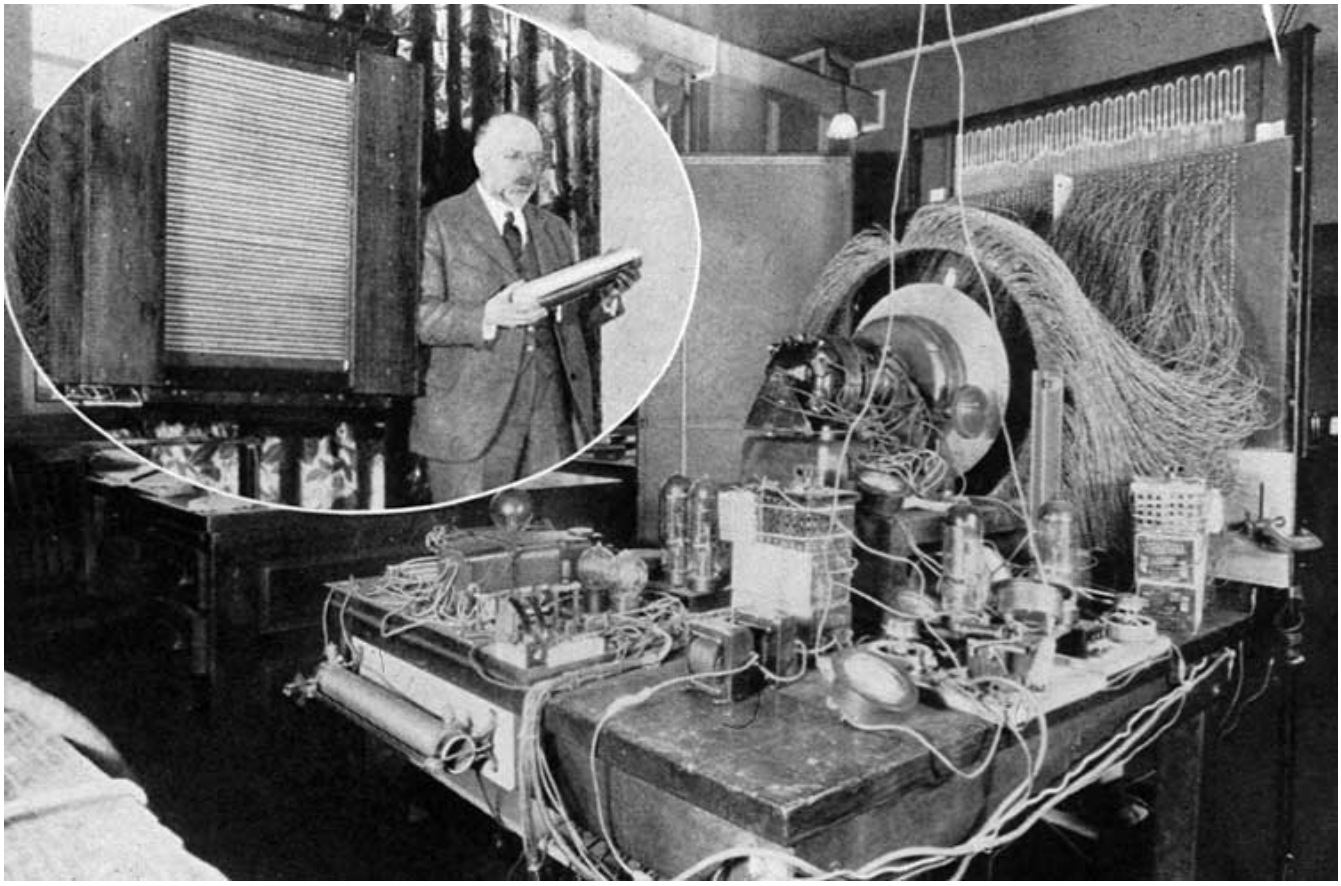
Here is a photo from 1927 of the motor and switch assembly

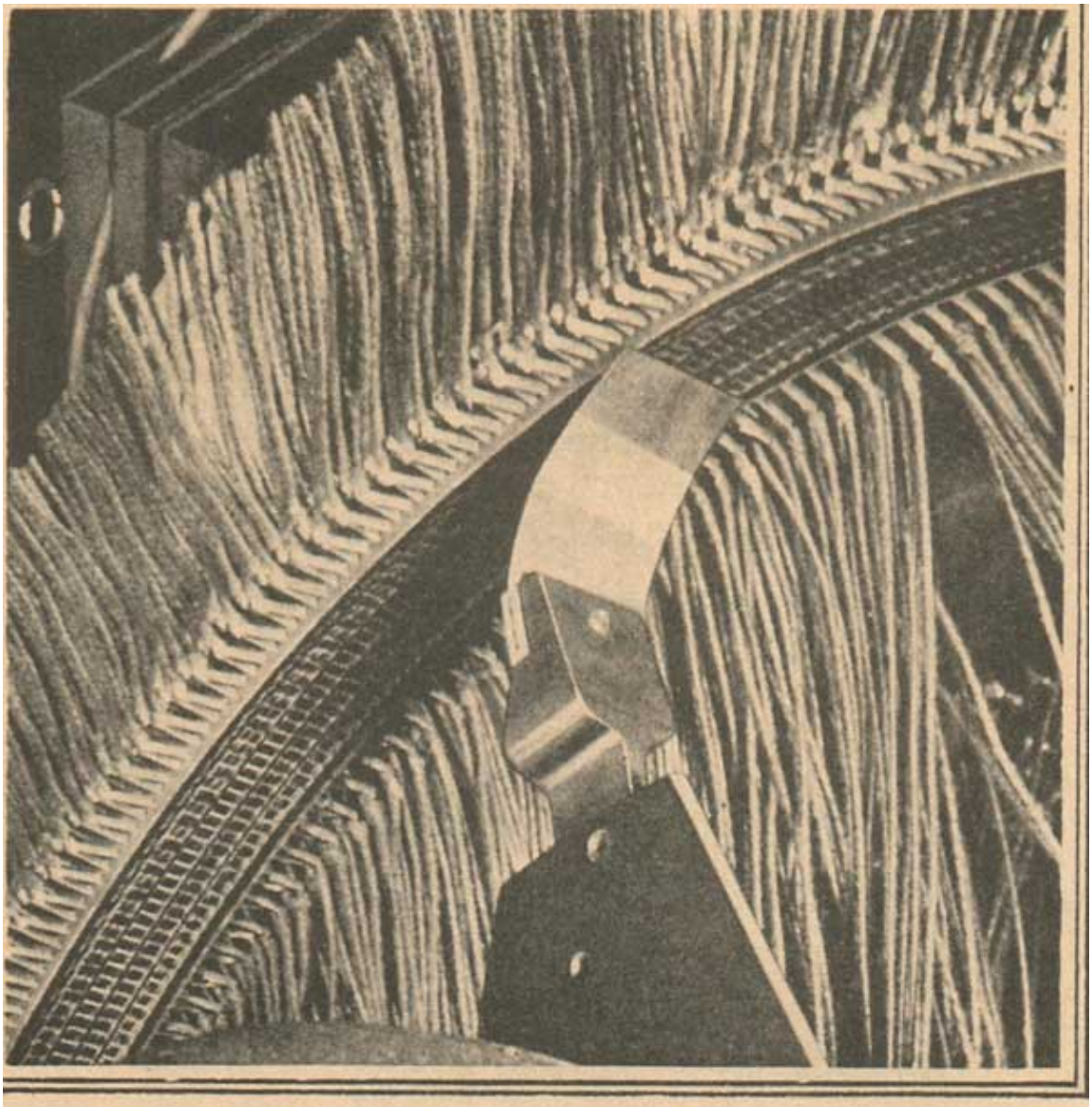
A modern photo of the side of the cabinet. The screen is facing toward the right back

The screen, showing the individual bulbs

The right side, with the door open

The left side of the cabinet, with the door open, showing the motor and switch





DETAILS OF THE DISTRIBUTOR. THE SLIDING BRUSH BEARING THE TELEVISION SIGNAL VOLTAGE IS A STRIP OF THIN SHEET METAL.

Detail of commutator

When it is desirable to present television images to a large audience, a special grid type of receiver is used. The grid has the appearance of an illuminated screen and can be seen throughout a large auditorium. The image is not projected on the screen from a lantern like a moving picture; such optical projection would be inefficient and demand the electrical control of an impractical amount of light. The picture current itself is distributed by a commutator to successive elemental areas of a large neon lamp. This lamp, as shown in Fig. 232, consists of a long, single, neon-filled tube bent back and forth to give a series of 50 parallel sections of tubing. The tube has one interior electrode and 2,500 exterior electrodes cemented along the back side of the glass tubing, Fig. 233. A high-frequency voltage applied to the interior electrode and any one of the exterior electrodes will cause the tube to glow in front of that particular electrode. The glow discharge actually passes to the inside wall of the glass tubing and the high-frequency current flows by a capacity effect out through the glass wall to the exterior electrode. The high-frequency voltage is commutated to the electrodes in succession from 2,500 bars on a distributor (Fig. 234) having a brush (Fig. 235) which rotates synchronously

with the disk at a transmitting station. Consequently, a spot of light moves rapidly and repeatedly across the grid in a series of parallel lines, one after the other, and in synchronism with the scanning beam at the transmitting station. With a constant exciting voltage the grid appears as a uniformly illuminated screen; but, when the high-frequency voltage is modulated by the received picture current, an image of the distant subject is produced on the screen and his motions can be followed just as in the smaller images formed in a disk.

This method of presenting television images to a large audience permits an efficient use of the available energy to reproduce a picture. The modulated current produces a glow discharge that exactly covers an elemental area of the picture on the screen and is viewed directly by the audience; consequently, there is absolutely no loss of energy after the picture current has been converted into light. In addition, each illuminated area of the screen responds to the picture current in the same manner; the exterior electrodes are exactly alike, and the use of a single tube assures the same pressure and purity of neon throughout the grid.

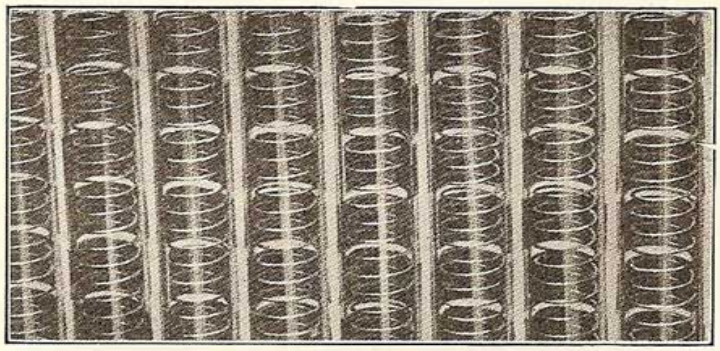


FIG. 233.—Method of construction of parallel sections of neon-filled tube.

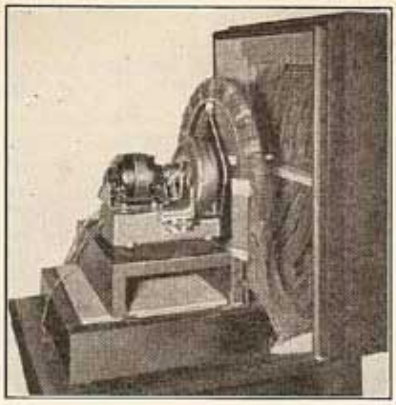


FIG. 231.—High-frequency voltage distributor for television.

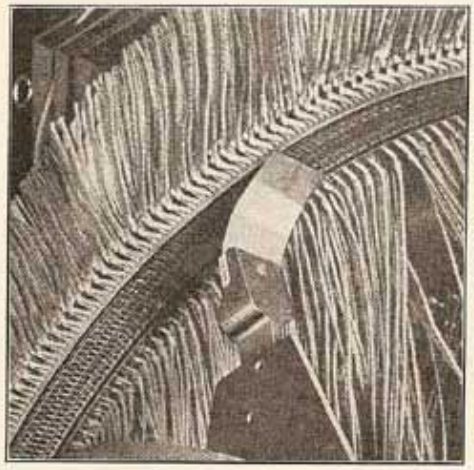


FIG. 235.—Brush for television distributor.

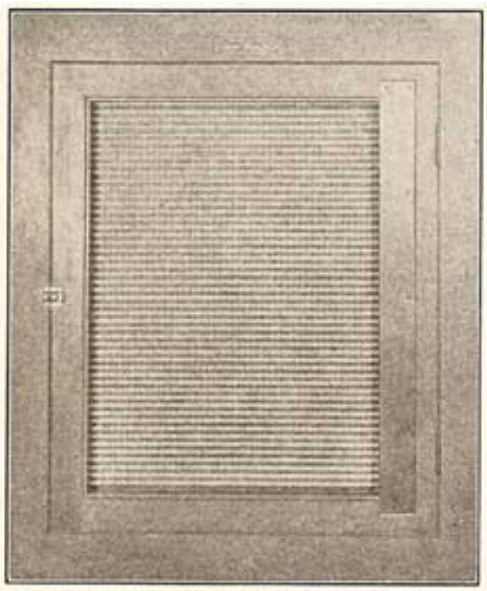


FIG. 232.—Neon-filled tube in parallel sections.

Practical Radio, 1928